

**APPENDIX I**

**Questionnaire for Growers with Some Aluminum Toxicity**  
**Research Project: Soil Quality Assessment in Long-Term Direct Seed to Optimize Production**

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Introduction: This brief questionnaire is addressed to those growers that the study has discovered have some problems with aluminum (Al) toxicity. As you know, Al toxicity is driven by low pH. Several remediation practices have been suggested for Al toxicity.

Q1. Given your knowledge at this time, please circle the # of the one practice you prefer:

#1. A single-pass tillage to mix the soil at 4-inch depth every few years, without adding lime.

#2. Using multi-pass tillage at a depth of your choosing every few years, without adding lime.

#3. Broadcasting lime and incorporating it with a cultivator to at least 4 inches.

#4. Broadcasting lime and using a subsoiler to encourage root penetration and distribute the lime.

#5. Incorporating lime with commercial fertilizer applicator.

#6. Incorporating lime with your fertilizer and seed using a direct seed drill.

#7. Incorporating lime at a certain depth with a spoke-wheel applicator.

#8. Bringing your micronutrients (zinc, molybdenum, nickel, etc.) to acceptable levels with a one-time broadcast application, without adding lime.

#9. Another practice of your own design.

#10. Do not know at this time, I need more information from this project or other sources.

Q2. If you chose #9, please describe this practice:

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Q3. Considering your current set of machinery, which of the nine practices, #1 through #9, would be least expensive?

\_\_\_\_\_

Q4. Most expensive? \_\_\_\_\_

Q5. Based on your knowledge, explain why one or more of options #1 through #9 may be mechanically difficult or impossible to implement:

\_\_\_\_\_  
\_\_\_\_\_

Q6. Assuming it was agronomically recommended, how reluctant would you be to perform one tillage pass before seeding? This would be done every four years. Place an X in appropriate line.

Would absolutely refuse \_\_\_\_\_ Strongly reluctant, but might do so \_\_\_\_\_

Would begrudgingly do so \_\_\_\_\_ Would do so with minor reluctance \_\_\_\_\_

Would enthusiastically do so \_\_\_\_\_

Q7. Assuming it was agronomically recommended, how reluctant would you be to perform two tillage passes before seeding? This would be done every four years. Place an X in appropriate line.

Would absolutely refuse \_\_\_\_\_ Strongly reluctant, but might do so \_\_\_\_\_

Would begrudgingly do so \_\_\_\_\_ Would do so with minor reluctance \_\_\_\_\_

Would enthusiastically do so \_\_\_\_\_

Q8. Assuming it was agronomically recommended, how reluctant would you be to perform three tillage passes before seeding? This would be done every four years. Place an X in appropriate line.

Would absolutely refuse \_\_\_\_\_ Strongly reluctant, but might do so \_\_\_\_\_

Would begrudgingly do so \_\_\_\_\_ Would do so with minor reluctance \_\_\_\_\_

Would enthusiastically do so \_\_\_\_\_

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Q9. Assuming it was agronomically recommended, how reluctant would you be to perform four tillage passes before seeding? This would be done every four years. Place an X in appropriate line.

Would absolutely refuse \_\_\_\_\_ Strongly reluctant, but might do so \_\_\_\_\_

Would begrudgingly do so \_\_\_\_\_ Would do so with minor reluctance \_\_\_\_\_

Would enthusiastically do so \_\_\_\_\_

Q10. Your  
Dominant Crop  
Rotation:

\_\_\_\_\_

\_\_\_\_\_

Q11. Your  
Dominant Tillage  
Sequence

\_\_\_\_\_

\_\_\_\_\_

Q12. Please write the name and average yield over 2010-2014 of crops or land uses (example fallow, with zero yield) you rotated with winter wheat. If you base your responses on written farm records, please indicate with an X and date below.

(Insert X)? \_\_\_\_\_ Date \_\_\_\_\_

Crop name. Include spring (S or winter (W)	Average yield for year(s) grown, include units such as bu, cwt, ton	List year(s) crop or land use was used among 2010-2014	Explain reason for good or bad average yield, use back of sheet if more space is needed

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Q13. Written record, or estimate, of annual winter wheat yields and other data, by field *if available*, and by whole farm. Please fill in shaded area for directional aspect and slope. If estimate, or records are not available for some year(s), write reason. If you base some year(s)' responses on written farm records, please indicate with X and list year(s) below.

Insert X \_\_\_\_\_ Year(s)

Year	Est. inches precipitation, Sept.-Aug. crop year, your farm	Yield (bu/ac)				<u>Whole Farm</u>
		<u>Field 1</u> Aspect: M= mixed, dominantly E, W,N or S  Slope _____ Position: M= mixed, dominantly Top, Mid, or Toe _____	<u>Field 2</u> Aspect: M= mixed, dominantly E, W,N or S  Slope _____ Position: M= mixed, dominantly Top, Mid, or Toe _____	<u>Field 3</u> Aspect: M= mixed, dominantly E, W,N or S  Slope _____ Position: M= mixed, dominantly Top, Mid, or Toe _____	<u>Field 4</u> Aspect: M= mixed, dominantly E, W,N or S  Slope _____ Position: M= mixed, dominantly Top, Mid, or Toe _____	
2014						
2013						
2012						
2011						
2010						

NOTES: If winter wheat was not grown in a field during the year, leave blank. Always complete whole farm yield.

Please enter any important comments for particular years and fields on the back of this sheet. For example, ("In 2010 within Field 1, 30% of crop winter killed and replanted to spring wheat", "In 2011, Whole Farm yield was reduced by estimated 25% due to early summer drought" "Severe wild oat infestation depressed yield during 2012 in Field 4").

**THANK YOU!**

**THE RESULTS SHOULD IMPROVE YOUR SOIL  
AND YOUR BOTTOM LINE**